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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/556,349 | 04/24/2000 | YIHONG GONG | CA1055 | 7865 |

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| EXAMINER | |
|---|---|
| HESSELTINE, RYAN J | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2623 | 8 |

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Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/556,349 | GONG ET AL. | |
| | Examiner | Art Unit | |
| | Ryan J Hesseltine | 2623 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *23 October 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-72* is/are pending in the application.

4a) Of the above claim(s) *18-30 and 48-72* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 31-47* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 April 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *3* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of Group I (claims 1-17 and 31-47) in Paper No. 8, filed October 23, 2003, is acknowledged.

### *Information Disclosure Statement*

2. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

### *Claim Objections*

3. Claims 39 and 44-46 are objected to because of the following informalities: it appears that applicant intended claim 39, which is similar to claim 9, to depend from claim 36, which is similar to claim 6. Similarly, it appears that applicant intended claims 44-46, which are similar to claims 14-16, to depend from claim 43, which is similar to claim 13. Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 39 and 44-46 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 39 recites the limitation "said singular value decomposition" in line 1-2. There is insufficient antecedent basis for this limitation in the claim.

7. Claim 44 recites the limitation "wherein in said (3) said plurality of sorted vectors" in line 1-2 and "said first cluster" in line 4. There is insufficient antecedent basis for these limitations in the claim.

8. Claim 45 recites the limitation "said first cluster" in line 1. There is insufficient antecedent basis for this limitation in the claim.

9. Claim 46 recites the limitation "each of said plurality of clusters" in line 1-2. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claims 1-5, 11, 12, 31-35, 41, and 42 are rejected under 35 U.S.C. 102(e) as being anticipated by Ratakonda (USPN 5,956,026, newly cited).

12. Regarding claims 1 and 31, Ratakonda discloses a method and computer-readable medium containing a program for summarizing a content of an input video sequence, said input

video sequence comprising a plurality of frames (column 3, line 21-29), said plurality of frames being grouped into a plurality of video segments (column 4, line 48-54), said method and program comprising: (a) selecting a frame cluster (represented by keyframe k1) in said input video sequence which corresponds to a most static one (minimized action) of said video segments (Figure 6; column 6, line 55-60; column 7, line 25-33); (b) computing a content value (cumulative action measure C) in said selected frame cluster (column 6, line 26-44); (c) using said computed content value to cluster remaining frames in said input video sequence (column 7, line 25-33; column 10, line 35-42).

13. Regarding claims 2 and 32, Ratakonda discloses that in said step (a), said frame cluster is selected using a refined feature space representation (treat each histogram as a feature vector of its associated frame) of said input video sequence (column 9, line 44-56).

14. Regarding claims 3 and 33, Ratakonda discloses that in said step (a), each of said plurality of frames is transformed into a histogram vector indicative of a spatial distribution of colors in said each of said plurality of frames (column 4, line 48-54).

15. Regarding claims 4 and 34, Ratakonda discloses that in said (a) each of said plurality of frames (finest level keyframes) is divided into a plurality of blocks, each of said plurality of blocks being represented by a histogram in a color space indicative of a distribution of colors within each of said plurality of blocks (column 11, line 1-17; column 14, line 15-47).

16. Regarding claims 5 and 35, Ratakonda discloses that each of said plurality of frames (finest level keyframes) is divided into a plurality of blocks and each said histogram vector comprises a plurality of histograms in a color space, each of said plurality of histograms corresponding to one of said plurality of blocks (column 11, line 1-17; column 14, line 15-47).

17. Regarding claims 11 and 41, Ratakonda discloses a step (d) including outputting a plurality of keyframes, each of said plurality of key frames representative of said clustered frames (column 4, line 54-63).

18. Regarding claims 12 and 42, Ratakonda discloses that said selecting comprises locating a cluster (having a histogram vector) closest to an origin (centroid or mean histogram assigned as a representative vector) of said refined feature space (column 10, line 5-42).

***Claim Rejections - 35 USC § 103***

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

20. Claims 6-9 and 36-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ratakonda as applied to claims 2, 32, and 33 above, and further in view of Lim (USPN 6,574,378, newly cited).

21. Regarding claims 6 and 36, Ratakonda does not disclose that said refined feature space representation is obtained using a singular value decomposition of said input video sequence. Lim discloses a method and apparatus for indexing and retrieving images using visual keywords wherein during indexing (or retrieval) of a visual document, a spatial aggregation map (SAM) of occurrences of visual tokens is created which represents a visual-content signature for the visual document (column 9, line 14-28). Subsequently, the SAM is input to a singular-value-decomposition (SVD) based coding module to produce a refined feature (reduced dimensionality) space representing a coded description of a visual document (column 9, line 29-

37). It would have been obvious to one of ordinary skill in the art at the time the invention was made to obtain a refined feature space using a singular value decomposition of an input video sequence as taught by Lim in order to reduce the dimensionality and possibly the noise in the spatial aggregation map to produce a coded description of a visual document (column 9, line 29-33).

22. Regarding claims 7 and 37, Ratakonda discloses that minimization (to a refined feature space) is performed using frames (keyframes) selected with a fixed interval (equispaced) from said input video sequence (column 7, line 42-49).

23. Regarding claims 8 and 38, Lim discloses that said selected frames (linearized SAM vectors) are arranged into a feature frame matrix (X), and wherein said singular value decomposition is performed on said feature frame matrix (column 9, line 33-44).

24. Regarding claims 9 and 39 (see above rejection under 35 U.S.C. 112, 2nd paragraph), Lim discloses that said singular value decomposition produces a matrix (X), each column of said matrix representing a frame (SAM vectors of visual documents) in a refined feature (reduced dimensionality) space corresponding to a frame in said input video sequence (column 7, line 33-44).

25. Regarding claims 17 and 47, Ratakonda discloses a method for summarizing a content of an input video sequence (column 3, line 21-29), said method comprising: (a) selecting frames (keyframes) from said input video sequence (column 4, line 54-63), said selected frames being taken at a fixed (equispaced) interval (column 7, line 42-49); (b) Lim discloses creating a feature frame matrix using said selected frames (SAM vectors of visual documents); (c) performing a singular value decomposition on said feature frame matrix to obtain a matrix representing said

video sequence in a refined feature space (see above discussion of claims 1 and 31); (d) Ratakonda discloses selecting a cluster (represented by keyframe k1) in said refined feature space corresponding to a most static (minimized action) video segment (Figure 6; column 6, line 55-60; column 7, line 25-33); (e) computing a content value (cumulative action measure C) corresponding to said selected cluster (column 6, line 26-44); (f) using said computed content value to cluster frames in said input video sequence (column 7, line 25-33; column 10, line 35-42).

26. Claims 10 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ratakonda as applied to claims 1 and 31 above, and further in view of Uchihachi et al. (USPN 6,535,639, newly cited), hereafter Uchichachi.

27. Regarding claims 10 and 40, Ratakonda does not disclose a step (d) using said clustered frames to output a motion video representative of a summary of said input video sequence. Uchihachi discloses automatic video summarization using a measure of shot importance and a frame-packing method wherein a video may be modified during playback to emphasize the measure of shot importance in order to de-emphasize less important shots, or skip shots entirely that are less important than a predetermined threshold, resulting in a summary or "video skim" (column 9, line 53-60). It would have been obvious to one of ordinary skill in the art at the time the invention was made to output a motion video representative of a summary of an input video sequence as taught by Uchihachi in order to emphasize the measure of shot importance by de-emphasizing or skipping less important shots and also allowing the user to generate a personal video summary (column 9, line 53-60).

28. Claims 13-16 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ratakonda as applied to claims 2 and 32 above, and further in view of Castelli et al. (USPN 6,122,628, newly cited), hereafter Castelli.

29. Regarding claims 13 and 43, Ratakonda discloses that said step (c) comprises: (c)(1) sorting a plurality of vectors in said refined feature space according to a distance of each of said vectors to an origin (representative vector) of said refined feature space representation (column 9, line 49-column 10, line 20); (c)(2) selecting a vector among said sorted vectors which is closest to an origin (representative vector) of said refined feature space representation and including said selected vector into a first cluster (column 10, line 35-37); (c)(3) clustering said plurality of sorted vectors in said refined feature into a plurality of clusters according to a distance between each of said plurality of sorted vectors and vectors in each of said plurality of clusters and an amount of information in each of said plurality of clusters (column 10, line 37-42).

30. Ratakonda does not explicitly disclose that the vectors are sorted in ascending order. Castelli discloses multidimensional data clustering and dimension reduction for indexing and searching wherein eigenvalues (characteristic values of a transformation matrix produced by singular value decomposition; column 11, line 9-16) are sorted by decreasing magnitude and a subset of ordered eigenvalues containing the largest eigenvalues are selected according to a selection criterion (column 11, line 25-31). Castelli sorts in decreasing order, but it would have been obvious to sort in ascending order, depending on the needs of the system. It would have been obvious to one of ordinary skill in the art at the time the invention was made to sort a

plurality of vectors in said refined feature space in ascending order as taught by Castelli in order to aid in the selection of the vectors (eigenvalues) according to a user-specified selection criterion (column 11, line 28-40).

31. Regarding claim 14, Ratakonda discloses that in said step (c)(3) said plurality of sorted vectors are clustered into said plurality of clusters such that said amount of information (action) in each of said plurality of clusters does not exceed an amount of information (action) in said first cluster (column 6, line 45-60).

32. Regarding claim 15, Ratakonda discloses that said first cluster is composed of frames (keyframes) based on a distance variation between said frames (column 8, line 52-63) and an average distance between frames in said first cluster (same as the distance since the keyframes are equispaced; column 7, line 45-49).

33. Regarding claim 16, Ratakonda discloses that each of said plurality of clusters is composed of frames (keyframes) based on a distance variation between said frames (column 8, line 52-63) and an average distance between frames in said each of said plurality of clusters (same as the distance since the keyframes are equispaced; column 7, line 45-49).

34. Claims 44-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ratakonda in view of Lim as applied to claim 38 above (see above rejections under 35 U.S.C. 112, 2nd paragraph).

35. Regarding claims 44, 45, and 46, see above rejections of claims 14, 15, and 16, respectively.

***Conclusion***

36. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. USPN 5,619,709 to Caid et al. discloses a system and method of context vector generation and retrieval using singular value decomposition. USPN 5,708,767 to Yeo et al. discloses a method and apparatus for video browsing based on content and structure. USPN 6,393,054 to Altunbasak et al. discloses a system and method for automatically detecting shot boundary and key frame from a compressed video data. USPN 6,473,095 to Martino et al. discloses a histogram method for characterizing video content. USPN 6,496,228 to McGee et al. discloses significant scene detection and frame filtering for a visual indexing system using dynamic thresholds.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan J Hesseltine whose telephone number is 703-306-4069. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 703-308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-0377.

rjh
January 14, 2004

JINGGE WU
PRIMARY EXAMINER